

Mass and Related Quantities, Switzerland, METAS (Metrology and Accreditation Switzerland)

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					Comments	NMI Service Identifier
Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?		
Mass	Mass standards	Comparison in air	1	100	mg			0.7 to 1.4	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	0.1	1	g			1.4 to 2	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	1	10	g			2 to 4	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	10	100	g			4 to 10	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	0.1	1	kg			10 to 50	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	1	10	kg			0.05 to 0.6	mg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	10	20	kg			0.6 to 1.5	mg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	20	100	kg			1.5 to 200	mg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	100	1000	kg			0.2 to 2	g	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	1000	10000	kg			2 to 120	g	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Volume of solid	Solid density standard, solid sample 1 kg	Hydrostatic weighing	45	450	cm ³	Reference temperature	20 °C	0.2 to 0.6	mm ³	2	95%	No		
Volume of solid	Mass standard: 1 g to 10 g, solid sample	Hydrostatic weighing	0.1	2	cm ³	Reference temperature	20 °C	0.4	mm ³	2	95%	No		
Volume of solid	Mass standard: 20 g to 0.2 kg, solid sample	Hydrostatic weighing	2	60	cm ³	Reference temperature	20 °C	0.2	mm ³	2	95%	No		

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Volume of solid	Mass standard 0.5 kg, solid sample	Hydrostatic weighing	60	120	cm ³	Reference temperature	20 °C	0.4	mm ³	2	95%	No		
Volume of solid	Mass standard 1 kg, solid sample	Hydrostatic weighing	120	320	cm ³	Reference temperature	20 °C	0.6	mm ³	2	95%	No		
Volume of solid	Mass standard 2 kg, solid sample	Hydrostatic weighing	130	260	cm ³	Reference temperature	20 °C	6.0	mm ³	2	95%	No		
Volume of solid	Mass standard 5 kg, solid sample	Hydrostatic weighing	260	650	cm ³	Reference temperature	20 °C	6.5	mm ³	2	95%	No		
Volume of solid	Mass standard 10 kg, solid sample	Hydrostatic weighing	650	1300	cm ³	Reference temperature	20 °C	8.0	mm ³	2	95%	No		
Density of solid	Solid density standard, solid sample 1 kg	Hydrostatic weighing	1500	22000	kg/m ³	Reference temperature	20 °C	0.002 to 0.1	kg/m ³	2	95%	No		
Density of solid	Mass standard: 0.001 kg to 0.01 kg	Hydrostatic weighing	7500	8500	kg/m ³	Reference temperature	20 °C	(0.0333/m - 0.333), m mass standard	kg/m ³	2	95%	No		
Density of solid	Mass standard: 0.02 kg to 0.2 kg	Hydrostatic weighing	7500	8500	kg/m ³	Reference temperature	20 °C	(0.0111 + 0.017/m), m mass standard	kg/m ³	2	95%	No		
Density of solid	Mass standard 0.5 kg	Hydrostatic weighing	7500	8500	kg/m ³	Reference temperature	20 °C	0.05	kg/m ³	2	95%	No		
Density of solid	Mass standard 1 kg	Hydrostatic weighing	7500	8500	kg/m ³	Reference temperature	20 °C	0.05	kg/m ³	2	95%	No		
Density of solid	Mass standard 2 kg	Hydrostatic weighing	7500	8500	kg/m ³	Reference temperature	20 °C	0.3	kg/m ³	2	95%	No		
Density of solid	Mass standard 5 kg	Hydrostatic weighing	7500	8500	kg/m ³	Reference temperature	20 °C	0.2	kg/m ³	2	95%	No		
Density of solid	Mass standard 10 kg	Hydrostatic weighing	7500	8500	kg/m ³	Reference temperature	20 °C	0.1	kg/m ³	2	95%	No		

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Absolute pressure	Pressure gauge	Gas medium	1.00E+03	2.54E+05	Pa			(2.00E-05 p + 2), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 2.0 Pa to 7.1 Pa	
Gauge pressure	Pressure gauge	Gas medium	1.00E+05	4.00E+06	Pa			(5.00E-5 p + 20), p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 25 Pa to 220 Pa	
Differential pressure	Pressure gauge	Gas medium	1.00E+05	4.00E+06	Pa	Differential mode	$p_{line} < (20 \text{ MPa} - p)$	(5.00E-05 p + 20), p differential pressure in Pa	Pa	2	95%	No	Uncertainty value range from 25 Pa to 220 Pa	
Gauge pressure	Pressure gauge	Gas medium	4.00E+06	2.00E+07	Pa			1.00E-04 p , p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 4.0E+02 Pa to 2.0E+03 Pa	
Gauge pressure	Pressure gauge	Oil medium	2.00E+06	1.60E+08	Pa			2.00E-04 p , p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 4.0E+02 Pa to 3.2E+04 Pa	
Gauge pressure	Pressure gauge	Oil medium	1.60E+08	4.00E+08	Pa			3.00E-04 p , p pressure in Pa	Pa	2	95%	No	Uncertainty value range from 4.8E+04 Pa to 1.2E+05 Pa	
Gauge pressure	Pressure gauge	Oil medium	4.00E+08	1.00E+09	Pa			5.00E-04 p , p pressure in Pa	Pa	2	95%	No	Uncertainty value range from 2.0E+05 Pa to 5.0E+05 Pa	
Force: tension and compression	Force measuring device	Deadweight	2.5	220	N			0.002	%	2	95%	Yes		
Force: tension and compression	Force measuring device	Deadweight	50	5500	N			0.002	%	2	95%	Yes		
Force: tension and compression	Force measuring device	Deadweight	1	110	kN			0.002	%	2	95%	Yes		
Force: tension and compression	Force measuring device	Lever amplification	20	2000	kN			0.01	%	2	95%	Yes		
Torque	Torque measuring devices	DIN 51309	1	9	Nm	Mode	clockwise, anticlockwise	2.50E-04		2	95%	Yes		
Torque	Torque measuring devices	DIN 51309	10	1000	Nm	Mode	clockwise, anticlockwise	5.00E-05		2	95%	Yes		

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Gravitational acceleration	On (stable) site	Absolute measurement	9.75	9.85	m/s ²	Ambient temperature	(20 ± 5) °C	8.0E-08	m/s ²	2	95%	No		
Mass flowrate (liquid)	Flow sensors	e.g. coriolis meters	6	10500	kg/h	Liquid	water	0.20	%	2	95%	Yes		CH1
						Temperature	5 °C to 95 °C							
						Pressure	5 bar to 8 bar							
						Pipe sizes	DN 15 - 50							
Volume flowrate (liquid)	Flow sensors	e.g. mechanical, electromagnetic, ultrasonic meters	6	10500	l/h	Liquid	water	0.20	%	2	95%	Yes		CH2
						Temperature	5 °C to 95 °C							
						Pressure	5 bar to 8 bar							
						Pipe sizes	DN 15 - 50							
Mass flowrate (liquid)	Flow sensors	e.g. coriolis meters	7	1600	t/h	Liquid	water	0.40	%	2	95%	Yes		CH3
						Temperature	ambient							
						Pressure	2.5 bar							
						Pipe sizes	DN 80 - 600							
Volume flowrate (liquid)	Flow sensors	e.g. mechanical, electromagnetic, ultrasonic meters	7	1600	m ³ /h	Liquid	water	0.40	%	2	95%	Yes		CH4
						Temperature	ambient							
						Pressure	2.5 bar							
						Pipe sizes	DN 80 - 600							
Volume flowrate (gas)	Flowmeters, gasmeters	e.g. wet gas meters, differential pressure	0.006	0.6	m ³ /h	Gas	air / inert gas	0.05	%	2	95%	Yes		CH5
						Conditions	ambient conditions							

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Volume flowrate (gas)	Flowmeters, gasmeters	e.g. wet gas meters, differential pressure	0.01	1.6	m ³ /h	Gas	air / inert gas	0.15	%	2	95%	Yes		CH6
						Conditions	ambient conditions							
Volume flowrate (gas)	Flowmeters, gasmeters	e.g. turbine meters, rotary piston	1	1000	m ³ /h	Gas	air	0.15	%	2	95%	Yes		CH7
						Conditions	ambient conditions							
					Pipe sizes	DN 25 - 300								
Volume (liquid)	Glas ware, proving tank	Any type of instrument	0.05	1000	l	Conditions	ambient conditions	0.006 to 0.01	%	2	95%	Yes	Water content at 15 °C or 20 °C	CH8
Air speed	Anemometer	Pulse or electrical output	0.02	13	m/s	Gas	air	(0.1 + 0.5/v), v speed in m/s	%	2	95%	Yes		CH9
						Conditions	ambient conditions							